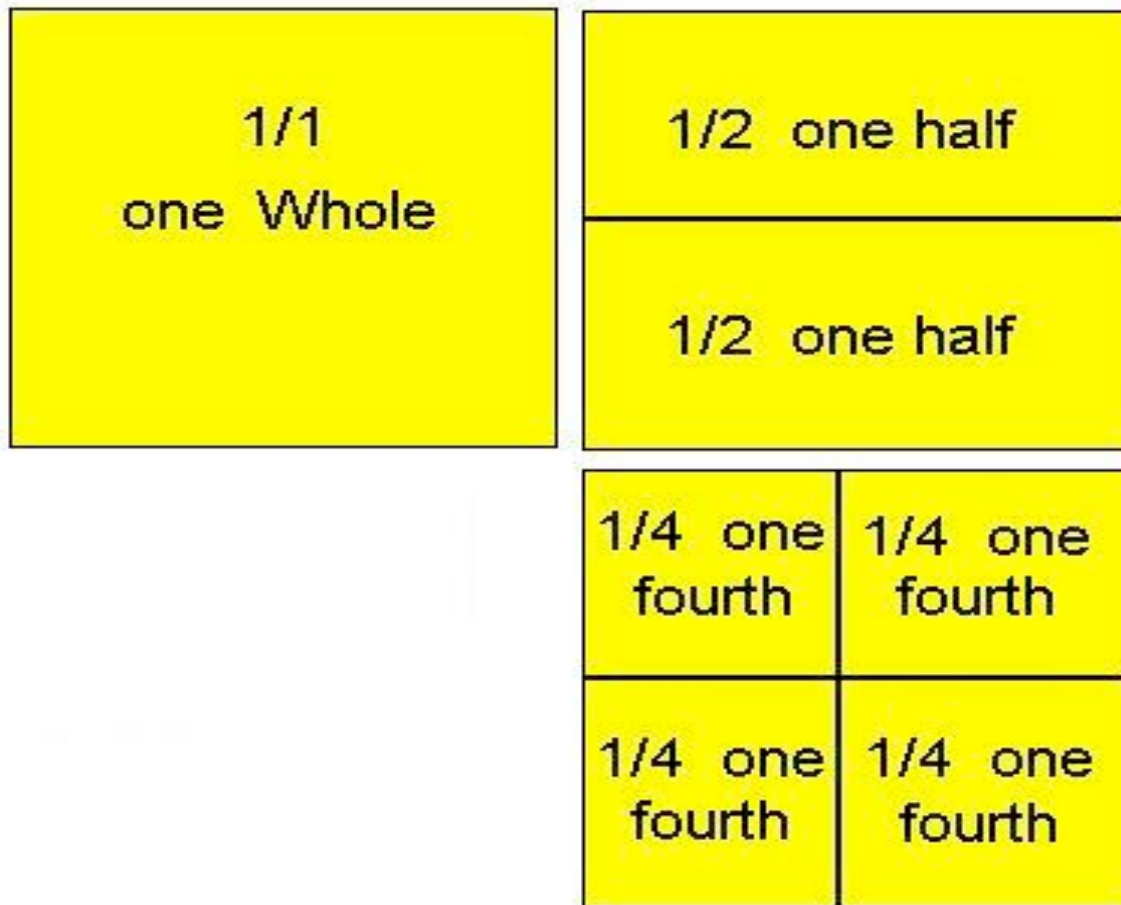


Fourth Grade Fractions



http://upload.wikimedia.org/wikibooks/en/9/92/Fractions_of_a_square.jpg

North Carolina Department of Public Instruction



PUBLIC SCHOOLS OF NORTH CAROLINA
State Board of Education | Department of Public Instruction

www.ncdpi.wikispaces.net



Overview

The implementation of the Common Core State Standards in Mathematics (CCSSM) is both an exciting and anxious time for teachers around the country. Part of the excitement is the CCSS inclusion of both the Content Standards and the Standards for Mathematical Practice. The Standards for Mathematical Practice provide a foundation for the process skills that all K-12 students should be developing during every lesson.

Overview of the Lessons

The purpose of this document is to provide teachers with a collection of lessons that are standards-based and align with the CCSS Content Standards and Standards for Mathematical Practice. By standards-based, we mean that students are learning mathematics by exploring mathematically-rich tasks and sharing strategies, ideas, and approaches with one another. During these lessons, the teacher's role is to truly facilitate learning by posing a task, asking questions that guide students' understanding, and assess students' mathematical understanding.

The phases of each lesson are:

- **Engage-** Students open the lesson by engaging in a brief activity to build upon students' prior knowledge.
- **Explore-** Students explore a mathematically rich task or activity that includes the main mathematical goals. During this phase, the teacher may model how to play a game or do an activity, but should not model or over teach strategies or procedures.
- **Explain-** Students discuss strategies and mathematical ideas from the Explore phase. The teacher may teach content and emphasize concepts or strategies here.
- **Elaborate-** Students complete a follow-up activity or task that extends their work from Explore and the discussion of concepts in Explain.
- **Evaluation of Students**
 - **Formative Assessment-** How can the teacher assess students during the lesson?
 - **Summative Assessment-** How can the teacher assess students' work after the lesson?

Resources on the Common Core

This document is only a starting resource as teachers begin implementing the CCSS and the Standards for Mathematical Practice. The North Carolina Department of Public Instruction has also written Unpacking Documents available at <http://www.ncpublicschools.org/acre/standards/support-tools/>. These unpacking documents provide specific descriptions of each standard as well as examples.

This project was directed by Dr. Drew Polly at UNC Charlotte. Educators who collaborated to create these documents are Gail Cotton, Ryan Dougherty, Tricia Esseck, Marta Garcia, Tery Gunter, and Kayonna Pitchford along with the DPI staff.



Unit Overview: Grade 4

Mathematical Goals

In this collection of lessons, students will:

- Build and compare fractions in a set.
- Explain why two fractions are equivalent even though they use different numbers.
- Name equivalent fractions and apply their knowledge of equivalent fractions.
- Compare two fractions with different numerators and different denominators by comparing them to benchmarks of $\frac{1}{2}$ and 1.
- Explain their reasoning when comparing fractions.
- Construct a number line to show equivalence of fractions with different denominators.
- Decompose a whole unit into an addition equation where all the fractions have the same denominator, and the sum is one whole.
- Apply, analyze, and communicate their understanding of fractions when while problem solving.
- Explain how to decompose a fraction on a number line.

Lessons

These lessons lay a strong foundation for other fraction concepts in grade four. These lessons should be students' first exposure to fractions in fourth grade.

Some of the materials needed are included at the end of each lesson.

Lesson	Title and Description
1	Design of Fractions; Students will use square tiles to make a design that fits the constraints of specific fractional parts. Materials: Task Cards A-H, 1 inch square tiles (red, blue, yellow, and green), 1 inch grid paper, crayons/markers
2	Race to One; Students play a game with equivalent fractions and adding fractions as they move various game pieces from 0 to 1 whole. Materials: Fraction Cards, Race to One Game Board, Race to One Rules , colored chips or counters per game
3	Fraction Buckets; Students compare fractions using the benchmarks 0, $\frac{1}{2}$, and 1. Materials: Fraction Card, Fraction Bucket Cards
4	Fraction Chain; Students place fractions on a number line and use the number line model to compare fractions. Materials: Fraction Cards, 6 – 10 foot strings (one per group), paper clips, math notebooks, graph paper
5	Kendall's Candy Company; Students decompose a fraction into unit fractions in the context of a candy store. Materials: connecting/pop cubes, math notebooks, markers/crayons
6	"Who am I?" Puzzles; Students use various fraction models to solve Fraction Mystery puzzles. They apply their knowledge of comparing fractions in this lesson. Materials: Puzzle Cards, fractions manipulatives (optional)

7	Fractions Tangrams ; Students explore with a set of tangrams and find the fractional value of each tangram piece if all of the tangrams represented one whole region. Materials: Tangrams Task Sheets, tangrams, template- http://mathforum.org/trscavo/tangrams/construct.html
8	Fraction Relay Race ; Students decompose 1 whole into fractional pieces on the number line. This lesson is situated in the context of a relay race where students need to determine how far each person runs so that the sum is 1 whole. Materials: Race Handout

Assessment in these lessons

Students can be assessed in the following ways:

- Includes observation, anecdotal notes, and student work samples
- Each lesson will include opportunities for formative assessment.
- Each lesson will include questions for teachers to consider during their observations.
- Student work samples will be included as benchmark samples.

Common Core Standards addressed in these lessons:

Number and Operations-Fractions

Extend understanding of fraction equivalence and ordering.

4.NF.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principal to recognize and generate equivalent fractions.

4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Build fractions from unit fractions by applying and extending previous understanding of operations on whole numbers.

4.NF.3 Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.

- Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
- Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples:* $\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$; $\frac{3}{8} = \frac{1}{8} + \frac{2}{8}$; $2 \frac{1}{8} = 1 + 1 + \frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8}$.

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

Lesson 1: Design of Fractions

Overview and Background Information

Mathematical Goals	<p>By the end of the lesson students will:</p> <ul style="list-style-type: none"> • Build and compare fractions in a set. • Explain why two fractions are equivalent even though they use different numbers.
Common Core State Standards	<p>Extend understanding of fraction equivalence and ordering. 4.NF.1 - Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principal to recognize and generate equivalent fractions.</p> <p>Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. 4.NF.3 - Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. <i>Examples:</i> $3/8 = 1/8 + 1/8 + 1/8$; $3/8 = 1/8 + 2/8$; $2 \frac{1}{8} = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$.</p>
Emphasized Standards for Mathematical Practice	<p>3. Construct viable arguments and critique the reasoning of others. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.</p>
Vocabulary	equivalent fractions
Materials	1 inch square tiles (red, blue, yellow, and green), 1 inch grid paper, crayons/markers, Task Cards A-H
Resources	None needed

Tasks in the Lesson

Engage

8-10 minutes

In this lesson students use 1 inch square tiles to create designs that follow certain criteria.

“Using the tiles at your desk, create a design that is one half blue.”

Allow students a minute or two to create their design. As they do, circulate around the room looking for simple and creative examples to share with the class.

After students complete their designs, discuss some of the differences in the class.

- Did everyone use the same colors?
- Does everybody’s design look the same? Why not? How can that be since half of the design had to be blue?
- Did everyone use the same amount of tile? Why or Why not?
- How did you decide what you were going to do to create this pattern?
- If we created another design, would you do it differently? How?

You may need to repeat this activity a few times before starting the Explore section of this lesson. Before moving on, students should see that there are many different options for each design. Just because the problem calls for a fraction in fourths, doesn’t mean they need to use four tiles. They also need to understand that they may only receive part of the information needed to solve the problems; they will need to fill in the rest.

Explore

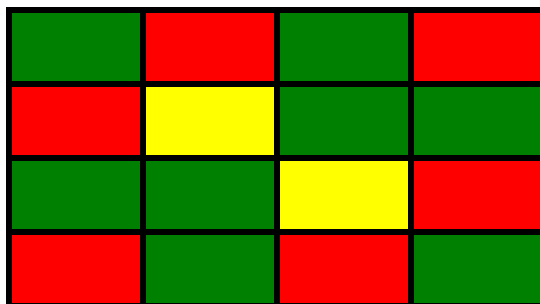
12-15 minutes

Students work in pairs or threes, to build designs with one inch tiles, based on the description given on a task card.

Each student builds their representation for the card. Once all students in the group have finished, they discuss their designs and decide on which one they will use for their representation for the class.

Once the students agree upon the design, each student will copy it onto a sheet of 1 inch graph paper.

Below the picture they are to write a description and an equation of all the colors used in their design.



“Our design for card C has $\frac{1}{8}$ yellow, $\frac{4}{8}$ green and $\frac{3}{8}$ red. $\frac{1}{8} + \frac{4}{8} + \frac{3}{8} = \frac{8}{8}$ or 1 whole.”

Start with Card A and work towards Card H. Most groups will not be able to finish all 8 cards in the time allotted for the lesson.

Explain

12-15 minutes

Bring all the students together and have them share the results of task cards A, B, and C.

Suggested questions

- What did you do for your task card?
- Do you think that this group's design fits the directions?
- How can you prove it?
- Compare two different designs, how are they similar and different?

Time permitting give the students 8 tiles and tell them that as a class you need to make a design that is $\frac{1}{2}$ red, $\frac{1}{4}$ green, $\frac{1}{8}$ yellow and $\frac{1}{8}$ blue.

Ask students to describe how they know how many tiles of the region match up to a specific fraction.

Elaborate

10-12 minutes

Have students create their own task cards. Students should use 24 total tiles and use the denominators 2, 3, 4, 6, 8 and 12.

Students need to make sure that the fractions add up to $\frac{24}{24}$ ths or 1 whole.

As students work, check to make sure that they have completed the puzzle and have written fractions in simplest form.

Evaluation of Students

Formative: As students are building the designs circulate around the room checking for misunderstandings. Are students using only the minimum number of tiles, can they use more?

How did they make the decision to use the number of tiles they did, and why did they choose these colors?

Review the students' description for clarity.

Summative: Have students collect their descriptions of each task card they were able to finish, and staple them together in a book.

Plans for Individual Differences

Intervention: Students who are struggling with this activity may need help in determining the number of tiles that will be found in their design. These students may need to start with very basic designs, using the minimum number of tiles.

Extension: If I was only able to use a certain number of tiles in my design, create task cards that a class would be able to use. Ex. I can only use 16 tiles, so create a design with $\frac{1}{4}$ blue, $\frac{1}{8}$ green, $\frac{1}{2}$ red and the rest yellow.



CARD A

Build a design that is...

- **One fourth red**
- **One fourth green**

CARD B

Build a design that is...

- **Two thirds yellow**

CARD C

Build a design that is...

- **One eighth yellow**
- **Four eighths green**

CARD D

Build a design that is...

- **One third blue**
- **Two thirds red**

CARD E

Build a design that is...

- **One half red**
- **One fourth yellow**

CARD F

Build a design that is...

- **Five twelfths blue**
- **One sixth red**
- **Two sixths green**

CARD G

Build a design that is...

- **One fifth red**
- **Four tenths green**
- **Two fifths blue**

CARD H

Build a design that is...

- **One third yellow**
- **One sixth red**
- **One half green**

Lesson 2: Race to One

Overview and Background Information

Mathematical Goals	By the end of the lesson students will: <ul style="list-style-type: none"> Name equivalent fractions Apply their knowledge of equivalent fractions while playing a game
Common Core State Standards	<p>Extend understanding of fraction equivalence and ordering.</p> <p>4.NF.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principal to recognize and generate equivalent fractions.</p> <p>b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. <i>Examples:</i> $3/8 = 1/8 + 1/8 + 1/8$; $3/8 = 1/8 + 2/8$; $2 \frac{1}{8} = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$.</p> <p>c. Add and subtract mixed numbers with like denominators; e.g., by replacing each mixed number with an equivalent fraction, and /or by using properties of operations and the relationship between addition and subtraction.</p>
Emphasized Standards for Mathematical Practice	<p>3. Construct viable arguments and critique the reasoning of others.</p> <p>7. Look for and make use of structure.</p>
Prior Knowledge Needed	This game is to be introduced after students have had some experience with equivalent fractions. It should be played throughout the remainder of the year.
Vocabulary	compose, decompose, equivalent fraction
Materials	Fraction Cards, Race to One Game Board, Race to One Rules, chips or counters per game
Resources	Adapted from Investigations in Number, Data, and Space – Pearson Education Inc. Computer version: http://illuminations.nctm.org/ActivityDetail.aspx?ID=18



Tasks in the Lesson

Engage 8-10 minutes

Students are given a gameboard for every pair of students playing. They must fill in the fractions on each fraction bar before playing. (Halves, Thirds, Fourths, Fifths, Sixths, Eighths, and Tenths)

Introduce the game Race to One by playing a practice game with the class.

Using just the fraction cards that are equal to or less than one, shuffle the cards and place them face down.

Start by placing one chip on each fraction bar at a location that is less than $\frac{3}{4}$. (Students will start at the beginning of the fraction bar during their game.)

Select a card from the pile and discuss the possible moves available to the students. The player can move one chip, or more than one chip during each play, but they must move the full amount on the chosen card. If a player is not able to move the full amount, they lose their turn.

Once a player moves a chip exactly to the number 1 on any fraction bar, they collect the chip. Place a new chip at the beginning of that fraction bar so every play has 7 chips available.

Play a few hands so students can get an idea of how to play.

Explore 30-35 minutes

Students play the game Race to One in pairs. Move throughout the room observing how the students are playing the game.

Suggested questions:

- What game piece are you moving?
- Are there other game pieces that you could also move? How do you know?
- Which move will help you get more pieces closest to one?

Explain 12-15 minutes

Bring the class back together after students have played the game for about 20 – 30 minutes.

Continue your practice game from the beginning of the class, but have students decide which chips to move and how far. Discuss the possibilities and the reasons why the students choose to make them.

Elaborate 10-20 minutes

Continue to play this game.

If students need an extension, tape two Race to One boards together, and make the game Race to Two. In this version, all the cards can be used.

Evaluation of Students

Formative:

As students are playing the game, observe them and pose questions to check for their mathematical understanding. Suggested questions are in the Explore section.

Summative:

If teachers want a summative assessment, pose an additional follow-up task, such as:

You have the card $\frac{3}{4}$. Name 3 possible moves that you can make on the game board.

- One move involves $\frac{1}{2}$
- One move that includes $\frac{1}{4}$
- One move that includes $\frac{1}{6}$

Plans for Individual Differences

Intervention:

For students who are struggling to find equivalent fractions, provide fraction manipulatives (fraction bars, fraction tiles) to help them.

Extension:

Play Get to Two the entire time if students need an extension.

Race to One Game Rules

1. Shuffle the fraction cards that are equal to or less than 1. Place them face down.
2. Place seven counters on the game board, one at the beginning of each fraction bar.
3. Player 1 draws the first card off the top of the deck of fraction cards. Move a chip (or chips) the total amount shown on the card. You can move one or more than one chip on every turn. You must move the full value of the fraction on the fraction card. Example: Player 1 chooses $\frac{3}{5}$; they can move one chip $\frac{3}{5}$ on the fifths line or $\frac{6}{10}$ on the tenths line. They can also move more than one chip the following ways: $\frac{1}{2}$ and $\frac{1}{10}$, $\frac{1}{5}$ and $\frac{4}{10}$, or $\frac{1}{3}$, $\frac{1}{6}$, and $\frac{1}{10}$.
4. Player 2 draws the next card off the top of the deck of fraction cards and moves their chip or chips the total found on their card. Players take turns flipping cards and moving chips.
5. When a chip lands exactly on one, the player has won the chip. Once a player has won a chip, another chip is placed at the beginning of the fraction bar so that there are always 7 chips being played at one time.
6. If you are unable to move the amount found on the fraction card, your turn is over.



$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{4}$
$\frac{3}{4}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$
$\frac{4}{5}$	$\frac{1}{6}$	$\frac{5}{6}$	$\frac{1}{8}$
$\frac{3}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{1}{10}$

$\frac{3}{10}$	$\frac{7}{10}$	$\frac{9}{10}$	$\frac{2}{2}$
$\frac{3}{2}$	$\frac{3}{3}$	$\frac{4}{3}$	$\frac{2}{4}$
$\frac{4}{4}$	$\frac{5}{4}$	$\frac{6}{4}$	$\frac{5}{5}$
$\frac{6}{5}$	$\frac{7}{5}$	$\frac{2}{6}$	$\frac{3}{6}$

<u>4</u> 6	<u>6</u> 6	<u>7</u> 6	<u>8</u> 6
<u>9</u> 6	<u>2</u> 8	<u>4</u> 8	<u>6</u> 8
<u>8</u> 8	<u>9</u> 8	<u>10</u> 8	<u>11</u> 8
<u>12</u> 8	<u>2</u> 10	<u>4</u> 10	<u>5</u> 10

$\frac{6}{10}$	$\frac{8}{10}$	$\frac{10}{10}$	$\frac{11}{10}$
$\frac{12}{10}$	$\frac{13}{10}$	$\frac{14}{10}$	$\frac{15}{10}$
$\frac{1}{1}$			

Lesson 3: Fraction Buckets

Overview and Background Information

Mathematical Goals	<p>By the end of the lesson students will:</p> <ul style="list-style-type: none"> Compare two fractions with different numerators and different denominators by comparing them to benchmarks of $\frac{1}{2}$ and 1 Explain their reasoning when comparing fractions
Common Core State Standards	<p>Extend understanding of fraction equivalence and ordering.</p> <p>4.NF.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principal to recognize and generate equivalent fractions.</p> <p>4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.</p>
Emphasized Standards for Mathematical Practice	<p>2. Reason abstractly and quantitatively.</p> <p>3. Construct viable arguments and critique the reasoning of others.</p>
Prior Knowledge Needed	<p>1 whole, half, mixed numbers, fractions greater than one, improper fractions</p> <p>This lesson should be taught as one of the beginning lessons on comparing fractions.</p>
Vocabulary	more than, less than, equal to, equivalent, greater than,
Materials	Fraction Cards , Fraction Bucket Cards
Resources	None needed



Tasks in the Lesson

Engage

8 - 10 minutes

Using the “Fraction Bucket” cards, have classroom discussion about how the cards could be positioned in front of the student (least to greatest). What about the “Fraction Bucket” cards helps the students make the decision? Discuss any misunderstandings about the buckets.

The teacher pre-selects 5 cards, one for each bucket, to demonstrate how to place them correctly to the class. Using one of the cards, the teacher places it on the correct bucket card while thinking out loud to the class. *“I have the card $\frac{4}{4}$, so I am thinking that if I had four parts out of 4 total parts, I would have all the parts. So I would have a whole. I am going to place this card in the one whole bucket.”* Repeat with another card.

As a class, determine where the next three cards would be placed. Discuss possible reasons for why the card belongs where it is placed. Look for multiple reasons. Would it be a better fit in a different bucket? Can students support each others’ ideas?

Explain that in a few moments students will be working with a partner to place many different fractions in the correct bucket.

Explore

18-20 minutes

Placing the Cards

Each pair of students should receive a copy of the “Fraction Bucket” cards and a set of fraction cards.

Students lay out the fraction bucket cards in the correct order. Shuffle the fraction cards and place them face down in front of themselves. Take turns flipping over a fraction card and placing them on the correct bucket. As the card is being placed on the bucket, the student must explain why they are choosing that particular bucket. If the partner agrees with the explanation, another card is flipped and the students continue. If the partner does not agree with the explanation, they get a turn to explain where they think it goes. Both students must agree on which bucket each card will be placed in. If the pair cannot agree, they can place the fraction card to the side for later. Repeat until all the cards have been placed.

As students do this:

Circulate around the room to observe the students at work. Listen to students reasoning as they place a card. Ask student to re-explain why a card is placed in a certain bucket. If there is a card that is not agreed upon, listen to both arguments, and help students find other cards that may help them make a final decision.

Checking the Cards

After all the fraction cards have been placed, students can self check by flipping the buckets over and matching their cards to the answer sheet. Students can keep notes of the cards they used in their notebook.

Shuffle the fraction cards and repeat.

Explain

10-12 minutes

Discussion about the Fraction Buckets

Choose one of the fraction buckets to discuss.

Suggested questions:

- What strategies did the students use to place cards in this bucket?
- What do all the cards have in common with each other?
- Repeat with other buckets.

Share highlights from the discussion the teacher was having as they went around the room.

- Were there any cards that gave you a hard time?
- What was difficult about the cards, how did other pairs solve these cards?

Elaborate

12-15 minutes

Placing Blank Cards

Give students blank fraction cards and have them create fractions for their partner to place.

In their math journal, write rules for each bucket. How can you determine what goes in each bucket.

Divide the cards between two students. Place the cards face down. Each student takes their first card and places it in the correct bucket. The student with the largest card takes their opponent's card. If a card is misplaced it is automatically forfeited. If there is a tie, a second card is drawn, and the winner takes all the cards.

Evaluation of Students

Formative: As students are working the teacher is evaluating the students' ability to place fractions in the correct location. Teachers are listening for the reasons why the student thinks the fraction belongs where they placed it. Are there certain fractions that are giving the whole class problems?

Possible Questions

1. Where would you place $\frac{6}{10}$? Why would you place it in the more than half and less than one bucket?
2. What do all the cards in the less than half bucket have in common?
3. If I had two fractions $\frac{2}{5}$ and $\frac{2}{3}$, how would I know which one is bigger?

Summative:

Students' work from various sections of this lesson can be analyzed as a summative assessment.

Plans for Individual Differences

Intervention:

Remove the cards that are not $\frac{1}{2}$ or 1. As the student becomes more familiar with these cards, introduce the less than half, followed by the more than half cards. Finally add the more than one card.

Bucket Cards

**Between One Half
and One Whole**



**Less than
One Half**

**More than
One Whole**



One Half

One Whole



Fraction Cards

<u>1</u>	<u>3</u>	<u>5</u>	<u>1</u>
2	2	2	3
<u>2</u>	<u>3</u>	<u>6</u>	<u>1</u>
3	3	3	4
<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
4	4	4	4
<u>1</u>	<u>3</u>	<u>4</u>	<u>5</u>
5	5	5	5
<u>6</u>	<u>9</u>	<u>2</u>	<u>3</u>
5	5	6	6

<u>5</u>	<u>6</u>	<u>2</u>	<u>4</u>
6	6	8	8
<u>5</u>	<u>8</u>	<u>11</u>	<u>3</u>
8	8	8	10
<u>5</u>	<u>9</u>	<u>10</u>	<u>3</u>
10	10	10	12
<u>6</u>	<u>9</u>	<u>12</u>	<u>10</u>
12	12	12	20



Between One Half and One Whole

Solution

	$\frac{2}{3}$	$\frac{3}{4}$
$\frac{3}{5}$	$\frac{4}{5}$	$\frac{5}{6}$
$\frac{5}{8}$	$\frac{9}{10}$	$\frac{9}{12}$

Less than One Half

Solution

$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$
$\frac{2}{6}$	$\frac{2}{8}$	$\frac{3}{10}$
	$\frac{3}{12}$	

More Than One Whole

Solution

$\frac{5}{2}$	$\frac{6}{3}$	$\frac{5}{4}$
$\frac{6}{5}$	$\frac{9}{5}$	$\frac{11}{8}$
	$\frac{3}{2}$	

One Half

Solution

$\frac{1}{2}$	$\frac{2}{4}$	$\frac{3}{6}$
$\frac{4}{8}$	$\frac{5}{10}$	$\frac{6}{12}$
	$\frac{10}{20}$	

One Whole

Solution

$\frac{3}{3}$	$\frac{4}{4}$	$\frac{5}{5}$
$\frac{6}{6}$	$\frac{8}{8}$	$\frac{10}{10}$
	$\frac{12}{12}$	



Lesson 4: Fraction Chain

Overview and Background Information

Mathematical Goals	<p>By the end of the lesson students will :</p> <p>Construct a number line using to show equivalence of fractions with different denominators.</p> <p>Compare fractions with the benchmarks of 0, $\frac{1}{2}$ and 1 whole.</p> <p>Explain their reasoning when comparing fractions.</p>
Common Core State Standards	<p>Extend understanding of fraction equivalence and ordering.</p> <p>4.NF.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principal to recognize and generate equivalent fractions.</p> <p>4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.</p>
Emphasized Standards for Mathematical Practice	<p>4. Model with mathematics.</p> <p>5. Use appropriate tools strategically.</p> <p>7. Look for and make use of structure.</p>
Prior Knowledge Needed	magnitude of fractions, number lines, and fractions in set and area models
Vocabulary	greater than, less than
Materials	6 – 10 foot strings (one per group), Fraction Cards, paper clips, math notebooks, graph paper
Resources	None needed

Tasks in the Lesson

Engage 8-10 minutes

Prior to beginning this lesson, set up strings around the room where students are going to work in groups of four. Have one string available for a whole group discussion.

Discuss with the class about using a number line as another way to represent a fraction. Where do we see fractions on number lines in the real world? Examples include measuring distances, thermometers, graphs, coordinate grids. Holding up a ruler to give students the context of $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$ of inches would be helpful.

Distribute the whole number cards (0-4) to each group of students. Discuss how we could arrange them on our number lines. (We don't want a discussion about leaving space between the numbers at this time; we are just looking for the order.) Have one student share how they would arrange the cards on the whole group's string.

Once students are in agreement, dismiss them to set the whole number cards on their own string, and return to the large group. Once the students have returned, discuss any differences between the group's number lines.

Hand out the halves number cards next. Explain to the class that they are going to add these cards to their number line. Students will not have to return this time to the large group.

Explore 18-20 minutes

Students place the halves number cards on their number line where they belong. They can adjust the whole number cards if they need to. If a half number card has the same value as a whole number card, the students are to hang it below the whole number card with a paper clip.

Once the majority of the class has set up their number line, stop everyone and discuss the work they have done up to this point.

- What changes to the number line did you need to make? Why?
- What did you do when you had $\frac{4}{2}$ as a card? Why did you place it under the 2?
- Are 2 and $\frac{4}{2}$ the same number? Why?
- Is there anything else that you notice about our number line at this time?
- Do you see any patterns beginning to form?

Hand out the remaining number cards (fourths, eights, and mixed numbers). Each group will need to place the cards on the number line. They are allowed to change or modify their number line at any time to make the task easier. They cannot remove any card from the number line, only move it.

As the students are completing the number line, the teacher is moving from group to group discussing patterns that students see, any problems they may be having, confirming or questioning students' conjectures, and redirecting students that need help.

Once the number line is complete and the teacher has checked it, students can recreate it in their math notebooks. They can also add any notes or findings they have made during the activity.

Explain 12-15 minutes

Bring the class back together to discuss the number lines. Add the halves to the group number line to represent the work that was done before the students were allowed to add the other number cards.

Have a student or students demonstrate how they began the process. Did they sort the cards into piles of like denominator or other groups? What were some of the first cards students placed? Why did they choose these cards?

Discuss changes that needed to be made to the number line as the activity continued. Were there any patterns the students discovered as they were placing their cards? Complete the whole group number line.

Look at a column of cards that are paper clipped together. What is similar about these fractions? Some students might say they are all the same number. Have students explain why that is.

Share the notes and conjectures students wrote in their notebooks.

Elaborate

More Denominators

Repeat this activity but use fraction cards that have thirds, sixths, and twelfths as denominators.

Suggested questions as students work:

Could you add any of the half and fourth cards as well?

Where would they go?

Culminating task

Give students the following task:

One student placed the fraction $1\frac{2}{3}$ between $1\frac{1}{2}$ and $1\frac{3}{4}$ on the number line. Are they correct?

Prove your answer using both a picture and a written explanation.

Evaluation of Students

Formative:

As students work, observe them and pose questions to check for their mathematical understanding.

Summative:

Students work from the Explore phase can be used as a summative assessment.

Plans for Individual Differences

Intervention:

Start with just the numbers 0 and 1. Once the student has placed all the card in the correct location, they can add the whole number 2 and the fractions in between.

Some students will need to build their number line on graph paper to have equal spacing between each interval. You may need to tape two pieces of graph paper together.

Extension: Students create a number line using all the cards (halves, thirds, fourth, sixths, eights and twelfths).

Choose two cards and compare them. Which one is bigger and how do you know? Can you justify your answer using just reason and not a mathematical process?

0

1

2

3

4

1

2

2

2

3

2

4

2

5

2

6

2

7

2

8

2

1

4

2

4

3

4

4

4

5

4

6

4

7

4

8

4

9

4

10

4

11

4

12

4

13

4

14

4

15

4

$\frac{16}{4}$	$\frac{1}{8}$
----------------	---------------

2

8

3

8

4

8

5

8

6

8

7

8

8

8

9

8

10

8

11

8

12

8

13

8

14

8

15

8

$\frac{16}{8}$	$\frac{1}{4}$
----------------	---------------

1	<u>1</u> 2
	1
	<u>3</u> 4

$$2 \frac{1}{4}$$

$$2 \frac{1}{2}$$

$$\begin{array}{r} 2 \\ 3 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 3 \\ 1 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 3 \\ \frac{1}{2} \end{array}$$

$$\begin{array}{r} 3 \\ \frac{3}{4} \end{array}$$

Lesson 5: Kendall's Candy Company

Overview and Background Information

Mathematical Goals	By the end of the lesson students will: <ul style="list-style-type: none"> Decompose a whole unit into an addition equation where all the fractions have the same denominator, and the sum is one whole.
Common Core State Standards	<p>Build fractions from unit fractions by applying and extending previous understanding of operations on whole numbers.</p> <p>4.NF.3 Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.</p> <p>a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.</p> <p>b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. <i>Examples:</i> $3/8 = 1/8 + 1/8 + 1/8$; $3/8 = 1/8 + 2/8$; $2 \frac{1}{8} = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$.</p> <p>c. Add and subtract mixed numbers with like denominators; e.g., by replacing each mixed number with an equivalent fraction, and /or by using properties of operations and the relationship between addition and subtraction.</p>
Emphasized Standards for Mathematical Practice	<p>4. Model with mathematics.</p> <p>7. Look for and make use of structure.</p> <p>8. Look for and express regularity in repeated reasoning.</p>
Prior Knowledge Needed	one whole, addition, composing and decomposing numbers
Vocabulary	compose, decompose, unit fraction
Materials	connecting/pop cubes, math notebooks, markers/crayons
Resources	none needed

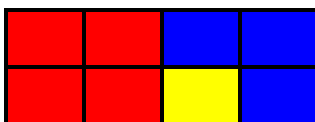
Tasks in the Lesson

Engage	10-12 minutes
<p>In today's activity students build "Special Bars" from different colored pop cubes. Each color will represent a different flavor of candy. The bars come in different sizes depending on the number of candies the buyer wants. The teacher will need to make a bar using 8 total pop cubes prior to the beginning of class.</p> <p><i>"Today we are going to pretend to visit a special candy store called Kendall's Candy Company. At the company they have a very unique candy bar called the Special Bar. This bar is special because the buyer of the bar is able to pick out all the flavors that will be in the bar. This way each bar is different and the buyer can get exactly what they want. As a treat, each person who visits the store</i></p>	

receives a free 8 piece Love Bug Bar at the end of their visit."

To personalize this task teachers may want to use their name, example: Mr. Smith, Smith Bar. Students could even use their names when designing a bar of their own.

"Let's look at the Special Bar that I made on my visit." Share with student a bar you created that has 8 pieces.



Take a moment to discuss the flavors that are possible. (see possible flavors)

Suggested Questions:

- Which flavor of candy do I have the most of?
- Which flavor of candy do I have the least of?
- How do you know which candy I have the most of?
- *How much of my bar is flavored blueberry? Cherry? Banana? Lime? etc.*

The answers of the students should be in fraction form. You are not asking how many pieces are certain flavors, but how much of the bar is that flavor. As students tell you the fraction for each flavor, record the fractions on the board.

If I add up the all the fractions $\frac{3}{8} + \frac{4}{8} + \frac{1}{8}$ I will get $\frac{8}{8}$ which is the whole candy bar.

Today you are going to build Special Bars of different sizes and record them in you math notebook. First you will build a Special Bar of that has 8 pieces of candy. Then you will record the bar by drawing it in your notebook. After that you will write an equation to show the sizes of your Special Bar. You will repeat the process with Special Bars of different sizes. (2, 3, 4, 5, 6, 8, 10, or 12 pieces)

Explore

18-20 minutes

Building and Recording Special Bars

Students work on building and recording different sized Special Bars. They first start with a bar that has 8 pieces of candy.

As the students are building and recording the bars, the teacher should be questioning the students work.

- How many (flavor) pieces do you have?
- How many more pieces would you need to complete a bar?
- Which do you have more of? Less of? Equal to?
- What does your equation look like?
- How are you getting the fractions for your equation?
- How does your representation match your Love Bug Bar?

Make sure the representations and equations that are being recorded are correct.

Explain	12-15 minutes
----------------	---------------

Students re-build their favorite Special Bar from the day. Bring the Special Bar and the equations for the bar to a large group meeting. Students share their drawings and discuss the equation that goes along with it.

Other students may want to try figuring out the equation before the presenting student shares it.

Elaborate	8-10 minutes
------------------	--------------

Students write a story problem about their Special Bar.

Regan's Special Bar was $\frac{4}{10}$ Cotton Candy, $\frac{5}{10}$ Marsh mellow, and $\frac{1}{10}$ Orange. Her dog, Izzy, ate all of the cotton candy pieces while she was at school. How much of her Love Bug Bar was remaining?

Students are given part of a bar, and need to complete the rest of the bar.

I have $\frac{7}{12}$ of my bar complete with banana and chocolate. I don't want any more banana or chocolate, but I want two more flavors, what are some of my options?

Evaluation of Students

Formative: As you are working with the students are they able to describe each section of the bar in fraction form? Can they create equations that equal a whole?

Summative: If I had a bar with 3 licorice, 3 cotton candy, 2 apple, and 4 orange pieces, could you draw what the bar looks like. Can you write an equation that represents my Love Bug Bar?

Plans for Individual Differences

Intervention: Limit the number of types of candy per Special Bar. Start with only two colors, and then continue to add one at a time.

Extension: Build the Mega Special Bar which is only sold for Valentine's Day. The Mega Special Bar has 100 pieces of candy, and can have up to 10 different types of candy.

Possible Flavors for the Colored Connecting Cubes

Red – Cherry

Blue – Blueberry

Light Green – Lime

White – Marshmallow

Brown – Chocolate

Black – Licorice

Yellow – Banana

Pink – Cotton Candy

Dark Green – Apple

Orange - Orange

Lesson 6: “Who am I?” Puzzles

Overview and Background Information

Mathematical Goals	<p>By the end of the lesson students will:</p> <ul style="list-style-type: none"> • Apply their understanding of fractions to solve Who am I puzzles. • Analyze the value of fractions while solving puzzles. • Communicate their reasoning while solving puzzles.
Common Core State Standards	<p>Extend understanding of fraction equivalence and ordering.</p> <p>4.NF.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principal to recognize and generate equivalent fractions.</p> <p>4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.</p>
Emphasized Standards for Mathematical Practice	<p>1. Make sense of problems and persevere in solving them.</p> <p>3. Construct viable arguments and critique the reasoning of others.</p>
Prior Knowledge Needed	Use this lesson as a review of comparing fractions
Vocabulary	greater than, less than
Materials	puzzle cards, fractions manipulatives (optional)
Resources	None needed

Tasks in the Lesson

Engage

10-12 minutes

Introduce the class to puzzle 1:

Puzzle 1

$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{4}{4}$ $\frac{5}{4}$

Show the first clue to the puzzle: "I am more than one half."

Which of these fractions does this clue help us eliminate? $\frac{1}{4}$ and $\frac{1}{2}$.

Discuss with the class why this clue helps us determine which choices to eliminate.

Show the second clue to the puzzle: "My denominator is larger than my numerator." How does this help us get closer to the answer? This will eliminate the fraction $\frac{5}{4}$, leaving us $\frac{3}{4}$ and $\frac{4}{4}$.

Show the last clue: "I cannot be written any other way." The only fraction left that can be written another way is $\frac{4}{4}$, which can be written as 1, so the answer has to be $\frac{3}{4}$.

After the class has discussed how to use the clues to solve the puzzles, explain that they will be working on more puzzles in pairs.

Explore

22-25 minutes

Students work in pairs or at stations to solve the remaining Fraction Puzzles. As the students are working, observe how the students are solving the puzzles. What are strategies that students use to get started? What clues do they not understand?

When students are finished with the remaining puzzles, students are to attempt to write their own fraction puzzles in their math notebook. Choose any five fractions, and write clues that will help eliminate a fraction or two at a time, but keep the others.

See if other classmates are able to solve their puzzles.

Explain

20 minutes

As a class discuss how students were able to solve the puzzles. What clues were most helpful, and what clues were least helpful? Which clues did students need help with?

Share some of the puzzles that the students made.

If time permits, work as a class to solve a few of the puzzles that students have created.

<p style="text-align: center;">Puzzle 1</p> <p style="text-align: center;">Who am I?</p> <p style="text-align: center;">$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{4}{4}$ $\frac{5}{4}$</p> <ul style="list-style-type: none"> • I am more than one half. • My denominator is larger than my numerator. • I cannot be written any other way. • I am _____. 	<p style="text-align: center;">Puzzle 2</p> <p style="text-align: center;">Who am I?</p> <p style="text-align: center;">$\frac{2}{3}$ $\frac{3}{4}$ $\frac{2}{5}$ $\frac{7}{10}$ $\frac{6}{8}$</p> <ul style="list-style-type: none"> • My numerator is an even number. • I am greater than one half. • I am written in simplest form. • I am _____.
<p style="text-align: center;">Puzzle 3</p> <p style="text-align: center;">Who am I?</p> <p style="text-align: center;">$\frac{2}{8}$ $\frac{4}{6}$ $\frac{9}{12}$ $\frac{3}{5}$ $\frac{5}{12}$</p> <ul style="list-style-type: none"> • I greater than $\frac{1}{4}$. • My denominator is a multiple of three. • I can be simplified. • When I am reduced, my numerator and denominator are less than five. • I am _____. 	<p style="text-align: center;">Puzzle 4</p> <p style="text-align: center;">Who am I?</p> <p style="text-align: center;">$\frac{1}{2}$ $\frac{5}{12}$ $\frac{1}{4}$ $\frac{8}{10}$ $\frac{2}{3}$</p> <ul style="list-style-type: none"> • I am less than one half. • I am greater than one third. • My denominator is a multiple of three. • I am simplified. • I am _____.

Puzzle 5

Who am I?

$\frac{2}{4}$ $\frac{3}{9}$ $\frac{1}{5}$ $\frac{7}{12}$ $\frac{9}{10}$

- I am greater than $\frac{1}{4}$.
- I cannot be reduced.
- I am closer to 1 than one half.
- I am _____.

Puzzle 6

Who am I?

$\frac{5}{4}$ $\frac{1}{5}$ $\frac{4}{6}$ $\frac{3}{8}$ $\frac{2}{10}$

- I am less than one.
- My denominator is even.
- I can be written in a different way.
- I am another way to say $\frac{2}{3}$.
- I am _____.

Puzzle 7

Who am I?

$\frac{6}{10}$ $\frac{4}{8}$ $\frac{5}{9}$ $\frac{1}{3}$ $\frac{3}{12}$

- I am greater than one fourth.
- I am not another way to write $\frac{1}{2}$.
- I am written in lowest form.
- I am less than one half.
- I am _____.

Puzzle 8

Who am I?

$\frac{7}{8}$ $\frac{4}{9}$ $\frac{2}{10}$ $\frac{9}{6}$ $\frac{2}{12}$

- I can be reduced to a simpler fraction.
- I am less than one.
- My denominator is a multiple of three.
- I am closer to one half than I am to zero.
- I am _____.

Lesson 7: Fraction Tangrams

Overview and Background Information

Mathematical Goals	By the end of the lesson students will: <ul style="list-style-type: none"> Compare parts/sections of a rectangle to the whole and to other parts/sections.
Common Core State Standards	<p>Extend understanding of fraction equivalence and ordering.</p> <p>4.NF.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principal to recognize and generate equivalent fractions.</p> <p>4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.</p>
Emphasized Standards for Mathematical Practice	<p>1. Make sense of problems and persevere in solving them.</p> <p>6. Attend to precision.</p> <p>7. Look for and make use of structure.</p>
Prior Knowledge Needed	<p>This lesson should be taught after students have learned to compare fractions. It can also be use to begin to explain equivalence of fractions.</p>
Vocabulary	greater than, less than, partition
Materials	<p>Tangrams Template- http://mathforum.org/trscavo/tangrams/construct.html</p> <p>Tangrams Task Sheets (attached)</p>
Resources	None needed

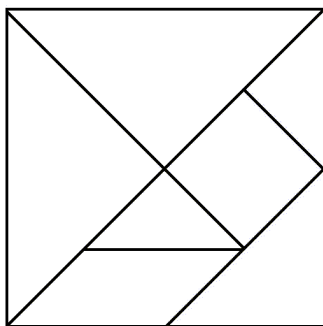
Tasks in the Lesson

Engage

8-10 minutes

Bring students together to introduce the tangram pieces if they are a new manipulative. These 7 pieces can be used to make different shapes and designs.

Today we are going to be using a square as our main shape. Have students work together to create the large square using all 7 pieces of the tangrams.



This square is going to represent our whole in today's activity. The job of the student is to determine what fractional size of each tangram piece, if the large square is one.

Explore

18-20 minutes

Let students work to figure out the fractional size of each tangram piece. It is assumed that the entire square (picture above) represents 1 or 1 whole. Some students may need to place piece on top of each other to compare them to each other.

On the tangram task sheet, students record the sizes of each piece. Afterwards, students are to write a description about how they determined the size of the pieces.

If students finish early, they can begin to solve Tangram Task Sheet 2.

Explain

12-15 minutes

After most students have finished Tangram Task Sheet 1, regroup the entire class together. Have students share the answers and the ways they found them.

Ask students for the different ways they started and the paths they took to solve the problems. Discuss any difficulties that students had or that you saw during the explore stage.

What strategies help the students find the sized of some of the pieces?

Students return to work on finishing Tangram Task Sheets 1- 2.

Elaborate

12-15 minutes

Students can repeat this activity with the large square not being the value of one. Choose one of the pieces in the tangram, and say that it is now 1, what size are the other pieces? What are the other sizes if the small triangle is $\frac{1}{2}$?

Evaluation of students

Formative: How are students using the size of other pieces to discover the size of the one they are working on?

Are students seeing the relationship of the sizes in the pieces?

Can the student explain their thinking and the steps they took to solve the puzzles?

Summative: Collect the Tangram Task Sheet 1. Allow students to edit and rewrite their explanation to how they solved the problem. (They may have to resolve the task to edit and rewrite.)

Plans for Individual Differences

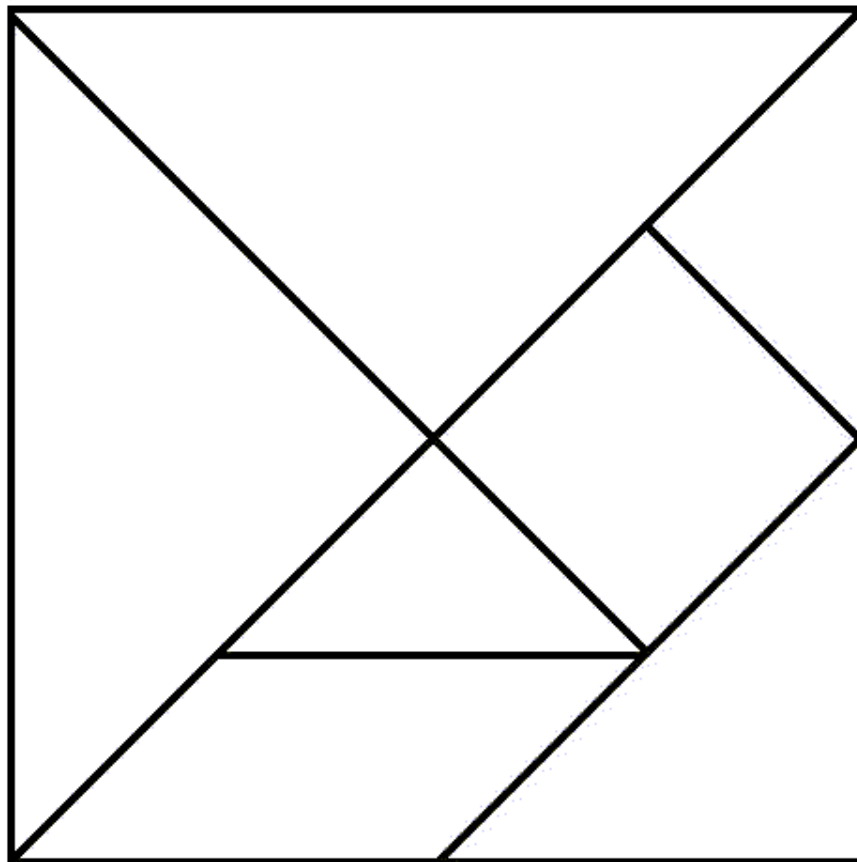
Intervention: Students who are having trouble with this activity may want to start with an easier puzzle or just a small section of the large square.

Extension: On Tangram Task Sheet 3, students can create their own puzzle and answer sheet.

Remind students that they need to be as accurate as possible when creating their own puzzle. Share their puzzles with others.

Tangram Task Sheet

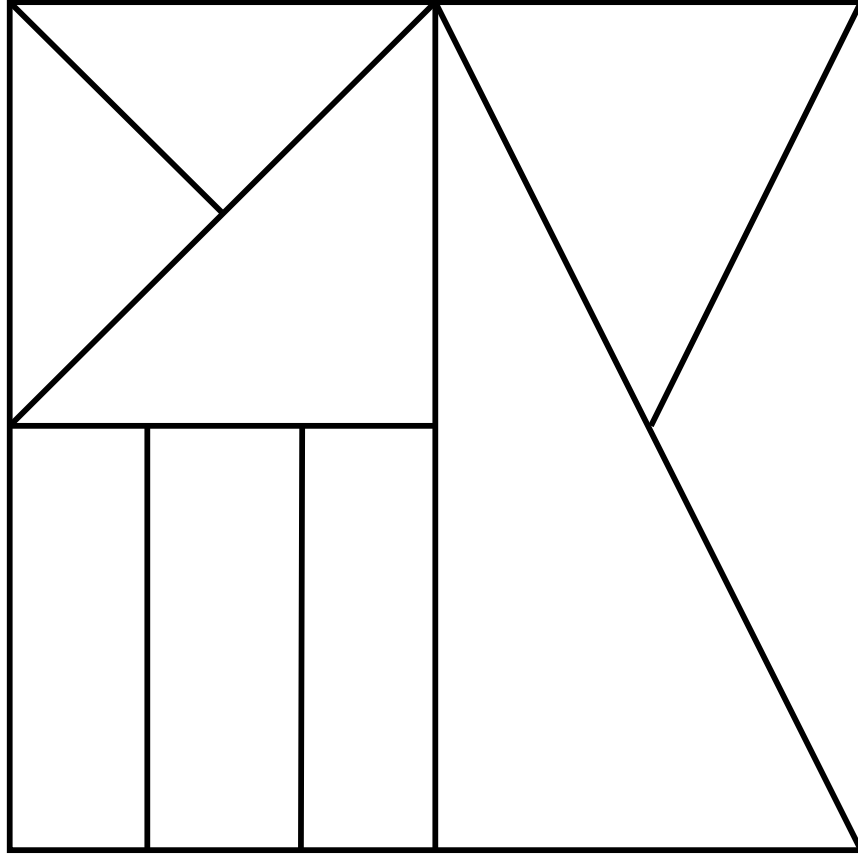
If the square is one whole, what is the value of each tangram piece in the picture below?



How did you discover the size of each piece?

Tangram Task Sheet 2

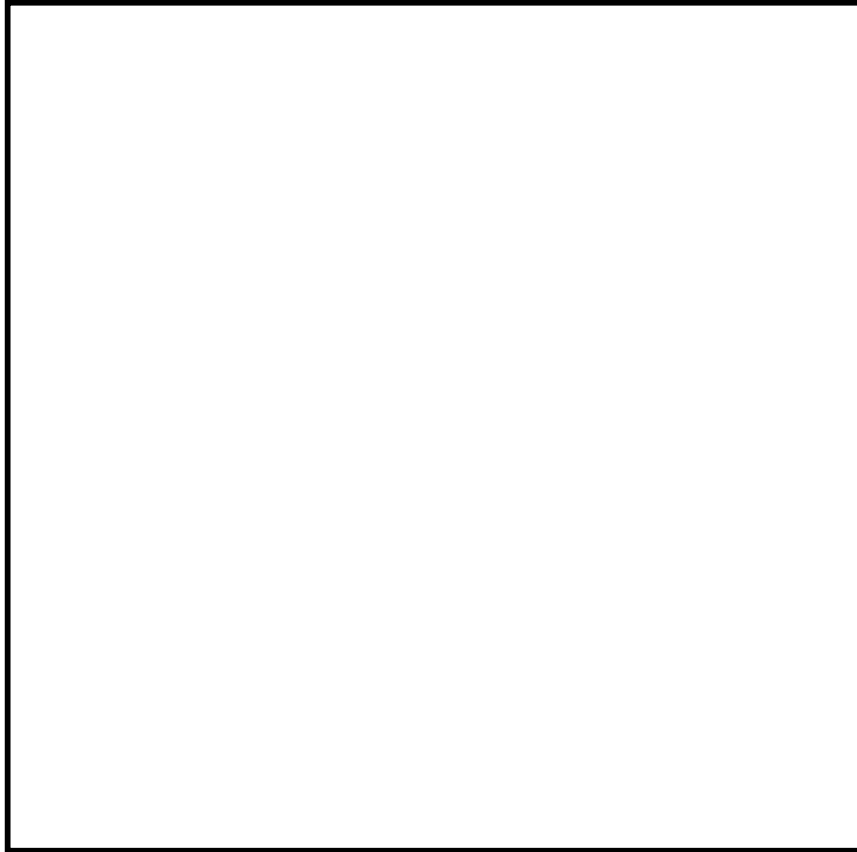
If the square is one whole, what is the value of each tangram piece in the picture below?



How did you discover the size of each piece?

Tangram Task Sheet 3

Create your own tangram puzzle for your friends to solve.

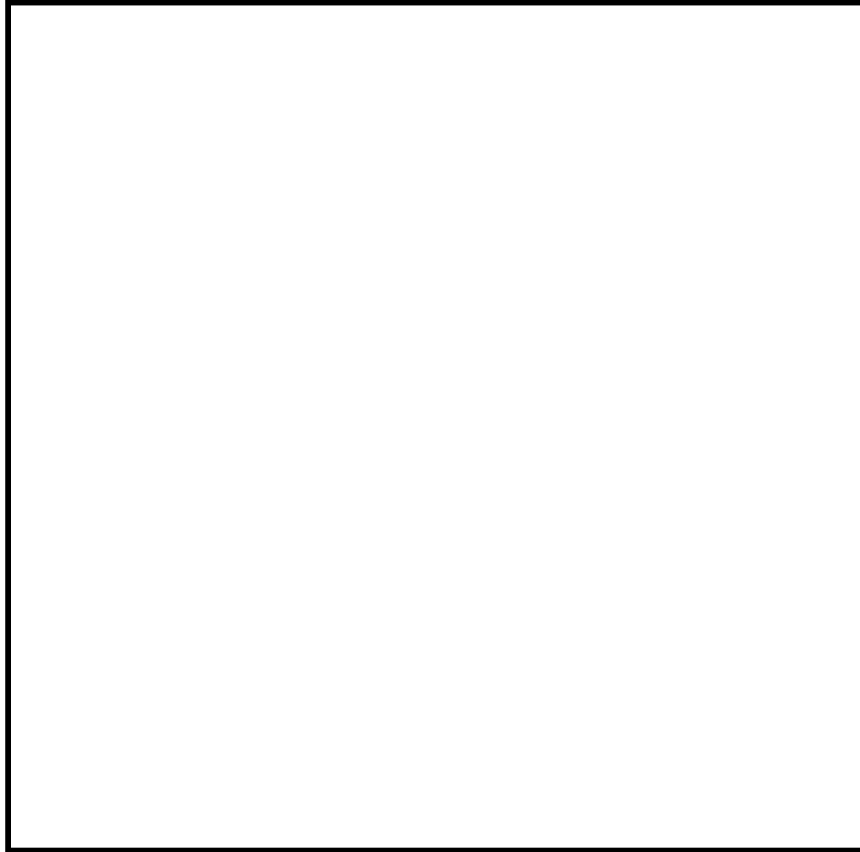


This puzzle was made by:

Tangram Task Sheet 3

Answers

Recreate your puzzle, and record the answers for your friends to check their answers.



This puzzle was made by:

Lesson 8: Fraction Relay Race

Overview and Background Information

Mathematical Goals	By the end of the lesson students will: <ul style="list-style-type: none"> Decompose a fraction on a number line. Explain how they decomposed a fraction into smaller fractions.
Common Core State Standards	<p>Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.</p> <p>4.NF.3 Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.</p> <p>a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.</p> <p>b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. <i>Examples:</i> $3/8 = 1/8 + 1/8 + 1/8$; $3/8 = 1/8 + 2/8$; $2 \frac{1}{8} = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$.</p>
Emphasized Standards for Mathematical Practice	<p>1. Make sense of problems and persevere in solving them.</p> <p>8. Look for and express regularity in repeated reasoning.</p>
Prior Knowledge Needed	Students should have some experience with decomposing fractions in other forms prior to this lesson.
Vocabulary	compose, decompose, fraction
Materials	Race handout
Resources	None needed



Tasks in the Lesson

Engage

15-18 minutes

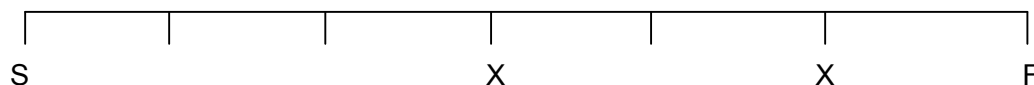
Today we are going to get ready for a relay race. Before we run the race we need to make a plan. Each team will have three people on it. Each person on a team has to run in the race, but they do not need to run the same distance. There are certain places during the race where you can hand off the baton to the next runner. You are going to get a chance to plan the distances of each runner on your team before the race begins.

Let's work together to try to make a plan for a team. Today's race will have different places that a team can hand off their baton to the next runner.

Draw a line on the board with a start and finish line. Mark 5 locations, equal distance apart, where students can hand off the baton. *This will break the track into 6 separate sections. Students may have a difficult time with the concept that there are 5 locations to hand off, but 6 sections to the race. This is a good time to discuss the fact that the distance between the marks is what we are considering and not the marks.*

Have students talk with their teammates to determine some possibilities to setting up the race. Remember that each person doesn't have to run the same distance.

Share a few of the students' ideas, and ask what fraction of the race each student will need to run.



In this race the first runner runs $\frac{3}{6}$ of the race, the second runner runs $\frac{2}{6}$, and the final runner runs $\frac{1}{6}$.

Write an equation for each idea. $\frac{3}{6} + \frac{2}{6} + \frac{1}{6} = \frac{6}{6}$ or 1 whole

Look for multiple ways to set up the race.

Explore

15-18 minutes

Students work on planning four different races. For each race the student teams need to find multiple ways to set up each race. They record the distance each runner will run, and then write an equation that will equal one whole.

Explain

12-15 minutes

Have students share their possibilities for each race and discuss their favorite and the reason why they chose it.

Make the connection between the races and a number line from 0 – 1.
How are these similar?

Elaborate

12-15 minutes

Set up a race outside using cones as hand off positions. Have the students run the race according to their plans.

What are some possibilities if we had only 2 people on a team? 4 people?

Evaluation of Students

Formative:

While students are working, observe them and pose questions to check for their mathematical understanding.

Summative:

Students' work from the Explore phase can be used as a summative assessment.

Plans for Individual Differences

Intervention:

If students are having difficulties provide them with fractions manipulatives (fraction bars, fraction tiles) to help them visualize the idea of decomposing a whole unit.

Extension:

If students are in need of an extension have them design a relay race that is 2 laps long so they have to decompose the number 2. You could also have them design a race that is $2\frac{1}{2}$ laps long.



Race 1

S					F
---	--	--	--	--	---

This race has 6 different sections to run. What are some possibilities that your team can run?

Runner 1	Runner 2	Runner 3	Equation

Which one of your options is your favorite one? Explain why.



Race 2

--	--	--	--

This race has 4 different sections to run. What are some possibilities that your team can run?

Runner 1	Runner 2	Runner 3	Equation

Which one of your options is your favorite one? Explain why.



Race 3

S									F
---	--	--	--	--	--	--	--	--	---

This race has 10 different sections to run. What are some possibilities that your team can run?

Runner 1	Runner 2	Runner 3	Equation

Which one of your options is your favorite one? Explain why.



Race 4

S							F

This race has 8 different sections to run. What are some possibilities that your team can run?

Runner 1	Runner 2	Runner 3	Equation

Which one of your options is your favorite one? Explain why.

